

## ABSTRACT

Apparatus and methods are provided for interacting light with particles, including but not limited to biological matter such as cells, in unique and highly useful ways. Optophoresis consists of subjecting particles to various optical forces, especially optical gradient forces, and more particularly moving optical gradient forces, so as to obtain useful results. In biology, this technology represents a practical approach to probing the inner workings of a living cell, preferably without any dyes, labels or other markers. In one aspect, a method is provided for separating particles having different dielectric constants by separating the particles in a medium having a dielectric constant chosen to enhance the sensitivity of the discrimination between the particles, and changing the medium to one having a dielectric constant which causes faster separation between the particles.